for extension of time this response is timely filed. Claims 1-105 were pending in the present application prior to the aforementioned amendment. Due to the above actions, claims 1, 9, 17, 25, 33, 41, 49, 56, 63, 70, 78 have been amended and claims 2, 10, 18, 26, 34 and 42 have been canceled to clearly recite subject matter to which Applicant is entitled. Further pursuant to 37 C.F.R. 1.121(c)(3), the applicant has submitted an entire set of presently pending claims which includes, at the end of this response, a marked copy of the claims for only those claims amended by this response. Accordingly, claims 1, 3-9, 11-17, 19-25, 26-33, 35-41 and 43-105 are still pending in the present application and, for the reasons set forth below, are believed to be in condition for allowance.

The Applicant submits that by the claiming of a pressure range as beginning with the "higher than 1 atm" of originally filed claim 1 and ending with the end point of "15 atms" of originally filed claim 2 (both of which have been searched/considered by the Examiner several times) no issue of new matter is raised by this Amendment, see MPEP Chapter 2163.05(at III).

The Examiner rejects claims 1-12, 14-16, 49-58, 60-62, 70-81, 83-85 and 94 under 35 U.S.C. 102(b) as clearly anticipated by **Ipri** (U.S. Patent No. 4,597,160). As the Examiner well knows, "a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. Of California*, 814 F.2d 628, 631, 2 USPQ2d 1051 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the...claims." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913 (Fed. Cir. 1989). A review of the Ipri '160 reference reveals that said reference does not teach each and every element of the claims, since the patentee does not teach (nor implicitly contain) some of the features of the independent claims. Specifically, a review of the process of Ipri (column 1, lines 60-68; column 2, lines 1-60; Figures 1-4) reveals that Ipri initially deposits an amorphous silicon (i.e., a-Si) islands on the substrate and then <u>simultaneously</u> performs the oxidation and crystallization. By doing this the <u>a-Si</u> on the surface of the island is oxidized which <u>does not meet</u> the limitation of the instant independent claims requiring "oxidizing the <u>crystallized</u>

semiconductor film" since the oxidation step is performed on the a-Si film. Further, the Examiner has provided no argument or documentation that such oxidation (of crystallized) silicon does inherantly take place in the process of Ipri. Further, the presently amended claims include the pressure range of "at a pressure greater than one atmosphere up to 15 atmospheres" which is also not shown by Ipri who uses a pressure of 1 atmosphere. For these reasons, the rejection of claims 1-12, 14-16, 49-58, 60-62, 70-81, 83-85 and 94 under 35 U.S.C. 102(b) as clearly anticipated by Ipri is improper and should be withdrawn.

With regard to the additional obviousness rejections of:

1. Claims 17-24, 63-69, 86-93 and 95 under 35 U.S.C. 103(a) as unpatentable over ***Ipri '160*** in view of ***Troxell et al.*** (U.S. Patent No. 4,851,363),
2. Claims 13, 59, 82, 98, 102 and 104 under 35 U.S.C. 103(a) as unpatentable over ***Ipri '160*** in view of pp. 216-217 of ***Wolf et al.***,
3. Claims 99, 103, and 105 under 35 U.S.C. 103(a) as unpatentable over ***Ipri '160*** in view of ***Troxell et al. '363*** and pp. 216-217 of ***Wolf et al.***,
4. Claims 25-36, 38-40 and 96 under 35 U.S.C. 103(a) as unpatentable over ***Ipri '160*** in view of pp. 171-175 of ***Wolf et al.***,
5. Claims 41-48 and 97 under 35 U.S.C. 103(a) as unpatentable over ***Ipri '160*** in view of ***Troxell et al. '363*** and pp. 171-175 of ***Wolf et al.***,
6. Claims 37 and 100 under 35 U.S.C. 103(a) as unpatentable over ***Ipri '160*** in view of pp. 171-175 of ***Wolf et al.*** and pp. 216-217 of ***Wolf et al.***, and
7. Claim 101 under 35 U.S.C. 103(a) as unpatentable over ***Ipri '160*** in view of ***Troxell et al. '363*** and pp. 216-217 of ***Wolf et al.*** and pp. 171-175 of ***Wolf et al.***

none of the secondary references set forth in these rejections cures the deficiencies of the Ipri reference discussed above.

The claimed invention is directed generally to a method of manufacturing a display device having a plurality of thin film transistors comprising the steps of forming a (non crystalline) semiconductor film over a glass substrate, crystallizing the semiconductor and oxidizing the **crystallized** semiconductor film to be active layers of the thin film transistors **at a pressure greater than one atmosphere up to 15 atmospheres** at a temperature lower than a strain point of the glass substrate. It should be noted that the claimed invention provides a step

of oxidizing the semiconductor layer under **the pressurized atmosphere at a pressure greater than one atmosphere up to 15 atmospheres** in order to lower the temperature below the strain point of the glass substrate.

As pointed out in the Applicant's amendment of September 4, 2001, in order to establish a *prima facie* obviousness rejection under 35 U.S.C. §103, a four-level factual inquiry must be conducted. First, determining the scope and content of the prior art. Secondly, ascertaining the differences between the claimed invention and the prior art. Thirdly, resolving the level of ordinary skill in the pertinent art. And last, an evaluation of objective evidence of non-obviousness, see MPEP Chapters 2143 and 2143.01, and *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). In essence, to establish a *prima facie* case of obviousness, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ 580 (CCPA 1974).

Applicant respectfully contends that the claims as presently set forth recite subject matter which is clearly not taught or suggested by the prior art of record. Specifically, none of the secondary references provides a teaching or motivation (suggestion) to teach one of ordinary skill in the art to carry out the claimed steps highlighted above. The closest reference is the Wolf (pages 216-217) where it is taught that crystallized silicon, <111> or <100>, can be efficiently oxidized at pressures up to 25 atmospheres. However, a review of the Ipri's discussion of the prior art (column 1, lines 11-35) reveals that the invention of Ipri of using a simultaneous oxidation and crystallization of the a-Si avoids the prior art problem of oxidizing crystallized silicon (p-Si), i.e., crystallize first – then oxidize crystallized silicon, where the oxidation proceeds along grain boundaries. Such growth produces a rough surface on the device which increases the surface scattering and thereby reduces the carrier field effect mobility in the channel region of the device. To combine the teachings of Wolf (pages 216-217) with those of Ipri to achieve the claimed invention as asserted by the Examiner would destroy the very essence of the Ipri invention. Such a combination is contrary to accepted case law regarding "teachings away", see MPEP Chapter 2143.01 at "THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE" and

"THE PROPOSED MODIFICATION CANNOT CHANGE THE PRINCIPLE OF OPERATION OF A REFERENCE."

In conclusion, the Applicant respectfully contends that the Ipri patent fails to expressly teach or suggest either alone or in combination with any of the secondary references all of the limitations presently set forth in the claimed invention necessary to support a *prima facie* case of obviousness under §103. Nor is there any motivation in the prior art of record to modify the Ipri patent to thereby accomplish what is set forth in the claimed invention without destroying the invention of Ipri. Therefore, the rejection of claims 13, 17-48, 59, 63-69, 82, 86-93 and 95-105 under 35 U.S.C. 103(a) as unpatentable over Ipri '160 in view of the secondary references recited above is improper and must be withdrawn.

Please note, that the Ligenza article (cited but not applied in any rejection), like the Wolf article (pages 216-217), teaches high pressure oxidation of crystallized silicon and not amorphous silicon.

Regarding the rejection of claims 1-105 under judicially establishing obviousness-type double patenting, the Applicant respectfully traverses these rejections as well for the same reasons as set forth above with regard to the rejections under §103. That is, as required by MPEP Chapter 804(B)(I), any rejection under the judicially established standard of obviousness-type double patenting must comply with the *Graham v. John Deere Co.* test outlined above, and a review of the Examiner's statement of the rejection reveals that this is simply not done. The Examiner's statement of the rejection must set forth a reason or motivation for combining the teachings of Fonash et al '851 with those of claims 1-26 of the '185 application or claims 1-44 of the '078 application. The fact that a teaching is (well) known in prior art, such as the "promoting catalyst" of Fonash et al, is an insufficient suggestion or motivation to combine the teachings of the secondary references with those of the primary reference to arrive at the claimed invention, again see MPEP Chapter 2143.01 (at page 2100-124). Specifically, Fonash et al (column 2, lines 49-66) teach the unacceptable processing time associated with using a substrate not coated with a "promoting catalyst" when performing the crystallization step; therefore, there is no motivation to

eliminate the "promoting catalyst" from the claims of the '185 or '078 applications to arrive at the claimed invention. Accordingly, without such a suggestion or motivation, the instant rejections of claims 1-105 under judicially establishing obviousness-type double patenting is improper and should be withdrawn.

Accordingly, Applicant respectfully contends that the claimed invention is directed to subject matter which is patentable over the prior art and also submit that the pending claims are in proper condition for allowance. If the Examiner believes further discussions with Applicants' representative would be beneficial in this case, she is invited to contact the undersigned.

Respectfully submitted,

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Marked-up Version of Amended Claims

IN THE CLAIMS:

Please amend the claims as follows.

1. (Four Times Amended) A method of manufacturing a semiconductor device having a plurality of thin film transistors, comprising the steps of:

forming a semiconductor film comprising silicon over a glass substrate;

crystallizing said semiconductor film; and

oxidizing the crystallized semiconductor film to be active layers of said thin film transistors in a pressurized atmosphere <u>at a pressure greater than one atmosphere up to 15 atmospheres and</u> at a temperature lower than a strain point of said glass substrate.

2. Canceled

3. A method according to claim 1, wherein said oxidizing is performed in an oxidizing atmosphere.

4. A method according to claim 1, wherein said oxidizing is performed in an oxidizing atmosphere containing water vapor.

5. A method according to claim 1, wherein said temperature is in a range of 500 to 650°C.

6. A method according to claim 1, wherein said semiconductor film has a thickness of 100 to 1,000 A.

7. A method according to claim 1, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

8. A method according to claim 1, wherein said semiconductor device comprises an active matrix type display device.

9. (Four Times Amended) A method of manufacturing a semiconductor device having a plurality of thin film transistors, comprising the steps of:

forming a semiconductor film comprising silicon on an insulating surface;

crystallizing said semiconductor film; and

oxidizing the crystallized semiconductor film to be active layers of said thin film transistors in a pressurized atmosphere at a pressure greater than one atmosphere up to 15 atmospheres and at a temperature of 500 to 650°C.

10. Canceled

11. A method according to claim 9, wherein said oxidizing is performed in an oxidizing atmosphere.

12. A method according to claim 9, wherein said oxidizing is performed in an oxidizing atmosphere containing water vapor.

13. A method according to claim 9, wherein said oxidizing step is a pyrogenic oxidation process.

14. A method according to claim 9, wherein said semiconductor film has a thickness of 100 to 1,000 A.

15. A method according to claim 9, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

16. A method according to claim 9, wherein said semiconductor device comprises an active matrix type display device.

17. (Four Times Amended) A method of manufacturing a semiconductor device having a plurality of thin film transistors, comprising the steps of:

forming a semiconductor film comprising silicon over an alkali-free glass substrate;

crystallizing said semiconductor film; and

oxidizing the crystallized semiconductor film to be active layers of said thin film transistors in a pressurized atmosphere at a pressure greater than one atmosphere up to 15 atmospheres and at a temperature lower than a strain point of said glass substrate.

18. Canceled

19. A method according to claim 17, wherein said oxidizing is performed in an oxidizing atmosphere.

20. A method according to claim 17, wherein said oxidizing is performed in an oxidizing atmosphere containing water vapor.

21. A method according to claim 17, wherein said temperature is in a range of 500 to 650 °C.

22. A method according to claim 17, wherein said semiconductor film has a thickness of 100 to 1,000 A.

23. A method according to claim 17, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

24. A method according to claim 17, wherein said semiconductor device comprises an active matrix type display device.

25. (Four Times Amended) A method of manufacturing a semiconductor device having a plurality of thin film transistors, comprising the steps of:

forming a semiconductor film comprising silicon over a glass substrate;

crystallizing said semiconductor film;

forming an insulating film adjacent to said crystallized semiconductor film by plasma CVD; and

forming gate electrodes adjacent to said insulating film,

wherein said method further comprises a step of oxidizing the crystallized semiconductor film to be active layers of said thin film transistors in a pressurized atmosphere <u>at a pressure greater than one atmosphere up to 15 atmospheres and</u> at a temperature lower than a strain point of said glass substrate.

26. Canceled

27. A method according to claim 25, wherein said gate electrodes are formed over

said active layers.

28. A method according to claim 25, wherein said oxidizing is performed in an oxidizing atmosphere containing water vapor.

29. A method according to claim 25, wherein said temperature is in a range of 500 to 650°C.

30. A method according to claim 25, wherein said semiconductor film has a thickness of 100 to 1,000 A.

31. A method according to claim 25, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

32. A method according to claim 25, wherein said semiconductor device comprises an active matrix type display device.

33. (Four Times Amended) A method of manufacturing a semiconductor device having a plurality of thin film transistors, comprising the steps of:

forming a semiconductor film comprising silicon on an insulating surface;

crystallizing said semiconductor film;

forming an insulating film adjacent to said crystallized semiconductor film by plasma CVD; and

forming gate electrodes adjacent to said insulating film,

wherein said method further comprises a step of oxidizing the crystallized semiconductor film to be active layers of said thin film transistors in a pressurized atmosphere at a pressure greater than one atmosphere up to 15 atmospheres and at a temperature of 500 to 650°C.

34. Canceled

35. A method according to claim 33, wherein said gate electrodes are formed over said active layers.

36. A method according to claim 33, wherein said oxidizing is performed in an

oxidizing atmosphere containing water vapor.

37. A method according to claim 33, wherein said oxidizing step is a pyrogenic oxidation process.

38. A method according to claim 33, wherein said semiconductor film has a thickness of 100 to 1,000 A.

39. A method according to claim 33, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

40. A method according to claim 33, wherein said semiconductor device comprises an active matrix type display device.

41. (Four Times Amended) A method of manufacturing a semiconductor device having a plurality of thin film transistors, comprising the steps of:

forming a semiconductor film comprising silicon over an alkali-free glass substrate;

crystallizing said semiconductor film;

forming an insulating film adjacent to said crystallized semiconductor film by plasma CVD; and

forming gate electrodes adjacent to said insulating film,

wherein said method further comprises a step of oxidizing the crystallized semiconductor film to be active layers of said thin film transistors in a pressurized atmosphere at a temperature lower than a strain point of said glass substrate.

42. Canceled

43. A method according to claim 41, wherein said gate electrodes are formed over said active layers.

44. A method according to claim 41, wherein said oxidizing is performed in an oxidizing atmosphere containing water vapor.

45. A method according to claim 41, wherein said temperature is in a range of 500 to 650°C.

46. A method according to claim 41, wherein said semiconductor film has a thickness of 100 to 1,000 A.

47. A method according to claim 41, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

48. A method according to claim 41, wherein said semiconductor device comprises an active matrix type display device.

49. (Four Times Amended) A method of manufacturing a semiconductor device having a plurality of thin film transistors, comprising the steps of:

forming a semiconductor film comprising silicon over a glass substrate;

crystallizing said semiconductor film; and

oxidizing the crystallized semiconductor film to be active layers of said thin film transistors in a pressurized atmosphere <u>at a pressure greater than one atmosphere up to 15 atmospheres; and</u> [of a pressure of 1 to 15 atms.]

wherein said oxidizing the semiconductor film is performed in a temperature lower than a strain point of said glass substrate.

50. A method according to claim 49, wherein said strain point of said substrate is 750°C or less.

51. A method according to claim 49, wherein said oxidizing atmosphere contains water vapor.

52. A method according to claim 49, wherein said temperature is in a range of 500 to 650°C.

53. A method according to claim 49, wherein said semiconductor film has a thickness of 100 to 1,000 A.

54. A method according to claim 49, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said heating step.

55. A method according to claim 49, wherein said semiconductor device comprises an active matrix type display device.

56. (Four Times Amended) A method of manufacturing a semiconductor device having a plurality of thin film transistors, comprising the steps of:

forming a semiconductor film comprising silicon on an insulating surface;

crystallizing said semiconductor film; and

oxidizing the crystallized semiconductor film to be active layers of said thin film transistors in a pressurized atmosphere <u>at a pressure greater than one atmosphere up to 15 atmospheres; and</u> [of a pressure of 1 to 15 atms]

wherein said oxidizing the semiconductor film is performed in a temperature of 500 to 650 °C.

57. A method according to claim 56, wherein said crystallizing step is performed at a temperature of 600°C.

58. A method according to claim 56, wherein said oxidizing atmosphere contains water vapor.

59. A method according to claim 56, wherein said oxidizing step is a pyrogenic oxidation process.

60. A method according to claim 56, wherein said semiconductor film has a thickness of 100 to 1,000 A.

61. A method according to claim 56, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said heating step.

62. A method according to claim 56, wherein said semiconductor device comprises an active matrix type display device.

63. (Four Times Amended) A method of manufacturing a semiconductor device having a plurality of thin film transistors, comprising the steps of:

forming a semiconductor film comprising silicon over an alkali-free glass substrate;

crystallizing said semiconductor film; and

oxidizing the crystallized semiconductor film to be active layers of said thin film transistors in pressurized atmosphere <u>at a pressure greater than one atmosphere up to 15 atmospheres; and</u> [of a pressure of 1 to 15 atms], for electrically isolating said plurality of thin film transistors from one another,

wherein said oxidizing the semiconductor film is performed in a temperature lower than a strain point of said glass substrate.

64. A method according to claim 63, wherein said strain point of said substrate is 750°C or less.

65. A method according to claim 63, wherein said oxidizing atmosphere contains water vapor.

66. A method according to claim 63, wherein said temperature is in a range of 500 to 650°C.

67. A method according to claim 63, wherein said semiconductor film has a thickness of 100 to 1,000 A.

68. A method according to claim 63, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said heating step.

69. A method according to claim 63, wherein said semiconductor device comprises an active matrix type display device.

70. (Four Times Amended) A method of manufacturing a semiconductor device having a plurality of thin film transistors, comprising the steps of:

forming a semiconductor film comprising silicon over a glass substrate;

crystallizing said semiconductor film;

forming an insulating film adjacent to said crystallized semiconductor film; and

forming gate electrodes adjacent to said insulating film,

wherein said method further comprises a step of oxidizing the crystallized semiconductor

film to be active layers of said thin film transistors in a pressurized atmosphere <u>at a pressure greater than one atmosphere up to 15 atmospheres; and</u> [of a pressure of 1 to 15 atms, and]

wherein said oxidizing the semiconductor film is performed in a temperature lower than a strain point of said glass substrate.

71. A method according to claim 70, wherein said strain point of said substrate is 750°C or less.

72. A method according to claim 70, wherein said gate electrodes are formed over said active layers.

73. A method according to claim 70, wherein said oxidizing atmosphere contains water vapor.

74. A method according to claim 70, wherein said temperature is in a range of 500 to 650°C.

75. A method according to claim 70, wherein said semiconductor film has a thickness of 100 to 1,000 A.

76. A method according to claim 70, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

77. A method according to claim 70, wherein said semiconductor device comprises an active matrix type display device.

78. (Four Times Amended) A method of manufacturing a semiconductor device having a plurality of thin film transistors, comprising the steps of:

forming a semiconductor film comprising silicon on an insulating surface;

crystallizing said semiconductor film;

forming an insulating film adjacent to said crystallized semiconductor film; and

forming gate electrodes adjacent to said insulating film,

wherein said method further comprises a step of oxidizing the crystallized semiconductor film to be active layers of said thin film transistors in a pressurized atmosphere <u>at a pressure</u>

greater than one atmosphere up to 15 atmospheres; [of at a pressure of 1 to 15 atms] and

wherein said oxidizing the semiconductor film is performed in a temperature of 500 to 650°C.

79. A method according to claim 78, wherein said crystallizing step is performed at a temperature of 600°C.

80. A method according to claim 78, wherein said gate electrodes are formed over said active layers.

81. A method according to claim 78, wherein said oxidizing atmosphere contains water vapor.

82. A method according to claim 78, wherein said oxidizing step is a pyrogenic oxidation process.

83. A method according to claim 78, wherein said semiconductor film has a thickness of 100 to 1,000 A.

84. A method according to claim 78, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

85. A method according to claim 78, wherein said semiconductor device comprises an active matrix type display device.

86. (Four Times Amended) A method of manufacturing a semiconductor device having a plurality of thin film transistors, comprising the steps of:

forming a semiconductor film comprising silicon over an alkali-free glass substrate;

crystallizing said semiconductor film;

forming an insulating film adjacent to said crystallized semiconductor film; and

forming gate electrodes adjacent to said insulating film,

wherein said method further comprises a step of oxidizing the crystallized semiconductor film to be active layers of said thin film transistors in a pressurized atmosphere at a pressure greater than one atmosphere up to 15 atmospheres; [of a pressure of 1 to 15 atms,] and

wherein said oxidizing the semiconductor film is performed in a temperature lower than a strain point of said glass substrate.

87. A method according to claim 86, wherein said strain point of said substrate is 750°C or less.

88. A method according to claim 86, wherein said gate electrodes are formed over said active layers.

89. A method according to claim 86, wherein said oxidizing atmosphere contains water vapor.

90. A method according to claim 86, wherein said temperature is in a range of 500 to 650°C.

91. A method according to claim 86, wherein said semiconductor film has a thickness of 100 to 1,000 A.

92. A method according to claim 86, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

93. A method according to claim 86, wherein said semiconductor device comprises an active matrix type display device.

94. A method according to claim 1, wherein said strain point of said substrate is 750°C or less.

95. A method according to claim 17, wherein said strain point of said substrate is 750°C or less.

96. A method according to claim 25, wherein said strain point of said substrate is 750°C or less.

97. A method according to claim 41, wherein said strain point of said substrate is 750°C or less.

98. A method according to claim 1, wherein said oxidizing step is a pyrogenic oxidation process.

99. A method according to claim 17, wherein said oxidizing step is a pyrogenic oxidation process.

100. A method according to claim 25, wherein said oxidizing step is a pyrogenic oxidation process.

101. A method according to claim 41, wherein said oxidizing step is a pyrogenic oxidation process.

102. A method according to claim 49, wherein said oxidizing step is a pyrogenic oxidation process.

103. A method according to claim 63, wherein said oxidizing step is a pyrogenic oxidation process.

104. A method according to claim 70, wherein said oxidizing step is a pyrogenic oxidation process.

105. A method according to claim 86, wherein said oxidizing step is a pyrogenic oxidation process.